

We Claim:

1. A device for disinfecting operatory unit water lines and water used in dental and surgical procedures, comprising:
- 5 a liquid source such as a pressurized water line or a reservoir;
an ozone generator using a corona discharge to produce an ozone containing gas;
a protection system that prevents liquid from the liquid source from entering the ozone generator;
- 10 an ozone mixing system that mixes and dissolves the ozone containing gas in the liquid;
a circulation system that circulates the liquid containing dissolved ozone through a pressurized liquid circulation passageway;
- 15 a separation system that separates undissolved gas from the ozonated liquid prior to circulating the ozonated liquid through the circulation passageway;
a reducing system that prevents ozone in the separated gas from escaping into the atmosphere by passing the gas through an ozone reducing material before venting; and
- 20 a liquid admitting system that inputs liquid from the liquid source into the mixing system to replace output liquid.
2. The device of claim 1 wherein pressure regulation means maintains proper pressure in the liquid circulation passageway.
- 25 3. The device of claim 1 wherein there is at least one connection in the pressurized liquid circulation passageway for outputting liquid with dissolved ozone.
4. The device of claim 1 wherein a control system causes the device to operate as desired to produce liquid containing dissolved
- 30 ozone and to circulate and output liquid containing dissolved ozone.
5. The device of claim 1 wherein more ozone is generated than can be dissolved in the liquid flow.

6. The device of claim 1 wherein the dissolved ozone concentration is determined by the solubility of ozone in the liquid.

7. The device of claim 1 wherein the ozone containing gas is mixed with the liquid by use of a positive pressure pump.

5 8. The device of claim 1 wherein the ozone containing gas is further mixed with the liquid by use of a static mixer.

9. The device of claim 1 wherein the ozone containing gas is mixed with the liquid by use of a gas diffuser.

10 10. The device of claim 1 wherein undissolved ozone containing gas is separated from the liquid by use of a porous hydrophobic material

11. The device of claim 1 wherein undissolved ozone containing gas is separated from the ozonated liquid at near atmospheric pressure.

15 12. The device of claim 1 wherein liquid is prevented from entering the ozone reducing material.

13. The device of claim 1 wherein liquid is prevented from entering the ozone reducing material by use of a porous hydrophobic barrier.

20 14. The device of claim 1 wherein the source of the liquid provides pressure to circulate and output the ozonated liquid.

15. The device of claim 1 wherein a pump provides pressure to circulate and output the ozonated liquid.

25 16. The device of claim 1 wherein the ozonated liquid is circulated through the pressurized liquid circulation passageway and liquid which is not outputted for use is discarded as waste.

17. The device of claim 16 wherein the ozonated liquid that is discarded as waste is directed to rinse a cuspidor.

18. The device of claim 1 wherein a pump for withdrawing liquid containing dissolved ozone from the ozone mixing system recirculates the liquid under pressure through a loop that conducts the liquid back to the ozone mixing system.

5 19. The device of claim 1 wherein an ozone sensor causes an indicator to show whether the device is operating properly.

20. The device of claim 19 wherein the ozone generate or and ozone mixing system are responsive to the ozone sensor.

10 21. The device of claim 1 wherein a valve controls the rate of output flow of the ozonated liquid.

22. The device of claim 1 wherein a porous hydrophobic barrier is used to prevent liquid from entering the ozone generator.

23. The device of claim 1 wherein the source of oxygen for the ozone generator is dried air supplied to an operator.

15 24. The device of claim 1 wherein air is dried by a desiccant protected from moist air by valves when the device is not being operated.

25. The device of claim 1 wherein a control system is responsive to a lack of supply water.

20 26. The device of claim 1 wherein a filter is installed in the liquid passageway.

27. The device of claim 1 wherein liquid containing dissolved ozone is recirculated through a multi-lumen, or plurality of, flexible tubing connected to a valved dispensing means.

25 28. The device of claim 27 wherein a valved dispensing means is located as near as possible to the point of use and is responsive to air pressure.

29. The device of claim 28 wherein the source of the air pressure is air used to drive a turbine in a hand piece.

30. The device of claim 1 wherein liquid level in the treatment chamber is monitored by a sensor in communication with a control system.

31. The device of claim 1 wherein a control system is
5 responsive to a period of non-use to turn the system off.

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